



# Unlocking learning:

The scale-up of EdTech to support learners in schools in Bosnia and Herzegovina

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# Key takeaways:

In Bosnia and Herzegovina, foreign language acquisition is an important component of education. The learning of foreign languages becomes compulsory from the first years of primary education.<sup>1</sup> Nonetheless, outdated teaching methods, materials and resources frequently hamper students' motivation and engagement with learning in foreign language lessons. As a result, a considerable share of students fail to meet foreign language learning goals established by cantonal curricula upon completing secondary education (Kovačević et al. 2018). The Akelius Digital Learning Application (Akelius app) provides opportunities to accelerate foreign language acquisition in a gamified learning environment. With the right conditions, teachers can incorporate the app as part of their teaching to meet curriculum goals while enhancing students' motivation.

To support the scale-up of the Akelius app across elementary schools in Una-Sana Canton (Bosnia and Herzegovina), led by its Ministry of Education, Science, Culture and Sport (MoE), this report provides evidence and key recommendations for an effective and equitable scale-up:

## 1. Get schools ready:

Access to connectivity and devices is unequal across elementary schools in Una-Sana Canton. Education Management Information System (EMIS) and ICT infrastructure data can be leveraged to identify and support elementary schools with limited connectivity or low device-to-student ratios.

## 2. Prepare teachers:

Incorporating technology in the classroom entails a drastic shift from traditional teaching methods. Providing teachers with a coherent package of practical teacher training, structured lesson plans, mentoring and peer-learning opportunities can support teachers to update their pedagogical approaches.

## 3. Support teachers:

Preparing and managing technology in the classroom can detract valuable time from teaching. Staffing elementary schools in Una-Sana Canton with well-equipped ICT coordinators could support this process.

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<sup>1</sup> The exact grade in which foreign language becomes a compulsory subject in primary education varies by canton. In Una-Sana Canton, foreign language becomes a compulsory subject from the third grade of primary education.

# Synopsis

Education curricula in Bosnia and Herzegovina include compulsory foreign language subjects from the first years of primary education. Yet outdated teaching methods, materials and resources frequently hamper students' motivation and engagement with learning in foreign language lessons in the country's elementary schools (Kovačević et al. 2018; Džanić and Hasanspahić 2020). This hinders quality learning for children. In this context, research evidence from Bosnia and Herzegovina suggests that EdTech can enhance students' motivation, while supporting teachers in catering to students' individual learning needs (Kovačević et al. 2018; Poleschuk et al. 2023). However, for EdTech to support quality learning and effective implementation remains crucial (Brossard et al. 2021; Nicolai et al. 2022).

*The Akelius app offers a gamified learning environment for children to learn languages in a fun way.*

In 2022, the Ministry of Education, Science, Culture and Sport in Una-Sana Canton (MoE), the United Nations Children's Fund (UNICEF) Bosnia and Herzegovina and Save the Children piloted the use of the Akelius Digital Learning Application (Akelius app) to enhance foreign language acquisition (English and German) among students in six elementary schools in the canton. The Akelius app offers a gamified learning environment for children to learn languages in a fun way. Teachers typically use the Akelius app with students on tablets, following a blended learning approach that integrates both digital and non-digital activities in face-to-face lessons to achieve learning goals.

The MoE is planning to scale up the use of the Akelius app across all elementary schools in the canton. To support this process, this report presents evidence from in-classroom implementation of the Akelius app in the pilot schools of Una-Sana Canton, together with lessons learned for an effective implementation. Lessons presented in this report are also relevant for education decision makers in the western Balkans and beyond seeking to scale up the use of EdTech across their education systems. These are organized around three key steps for the scale-up of EdTech programmes:



### 1. **Getting schools ready to harness blended learning:**

Differences in access to digital devices and connectivity across elementary schools can hinder an equitable scale-up of blended learning in Una-Sana Canton, including the Akelius app. Available Education Management Information System (EMIS) and ICT infrastructure data can be used to identify and support schools lacking access to connectivity and devices.

In schools with limited connectivity or low device-to-student ratios, implementation of the Akelius app can be supported through a careful scheduling of Akelius app lessons and the use of the Classroom Server, which allow students to access digital learning content on their devices offline.



### 2. **Preparing teachers to incorporate technology in the classroom:**

Blended learning, or the combination of digital and non-digital activities in the classroom, presents a considerable departure from how teachers in Una-Sana Canton usually prepare and deliver their lessons. Practical teacher training programmes, which offer opportunities for hands-on learning, are fundamental to building skills among teachers who have limited experience with blended learning. This includes practice on how to troubleshoot devices or manage the classroom when using the Akelius app. Providing teachers with structured lesson plans (which present digital and non-digital activities that can be combined in a lesson to achieve specific curricular goals), mentoring or peer-learning opportunities can also support teachers to incorporate the Akelius app in their lessons.



**3. Supporting teachers to deliver blended learning:** When teachers incorporate technology in the classroom, they assume additional responsibilities on top of their regular teaching for which they do not always have support or incentives. These include preparing lessons with the Akelius app, or setting up, troubleshooting, distributing, collecting and storing ICT devices before and after each lesson. In Una-Sana Canton elementary schools, well-equipped ICT coordinators could support this process. School ICT protocols, tablet laboratories, adequate charging and storage systems and incentives to incorporate technology can also facilitate and encourage the introduction of technology in the classroom.





# 1. Introduction

This research report explores the challenges and opportunities in the implementation of education technology (EdTech) to support teachers in building foreign language competences (English and German) among students in the elementary schools of Una-Sana Canton, Bosnia and Herzegovina. Foreign language acquisition is an important component of education in Bosnia and Herzegovina, where the learning of foreign languages becomes compulsory from the first years of primary education (European Commission et al. 2023).<sup>2</sup> However, evidence suggests that students in Bosnia and Herzegovina frequently fail to meet the foreign language proficiency requirements established by cantonal curricula upon completing secondary education (Kovačević

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<sup>2</sup> The exact grade in which foreign language becomes a compulsory subject in primary education varies by canton. In Una-Sana canton, foreign language becomes compulsory subject from the third grade of primary education.

*Teachers typically leverage the Akelius app to support their teaching through a blended learning approach, combining digital and non-digital activities in the classroom to enhance the quality of learning and foster digital skills.*

et al. 2018). Outdated teaching methods, materials and resources are typical obstacles to quality learning in foreign language classes, which place limited emphasis on students' active communication and do not relate to everyday situations and conversations, in turn hindering students' motivation and engagement with learning (Kovačević et al. 2018; Džanić and Hasanspahić 2020). Evidence from Bosnia and Herzegovina shows that the appropriate implementation of EdTech can enhance student motivation and support teachers in catering to students' individual learning needs (Kovačević et al. 2018; Poleschuk et al. 2023). Nonetheless, the introduction of technology in the classroom alone does not guarantee the effectiveness of EdTech. Instead, its effectiveness depends on a variety of factors, including the learning ecosystem in which it is introduced and the teacher's approach to its implementation (Brossard et al. 2021; Nicolai et al. 2022). This raises questions about the best strategies for scaling up the delivery of EdTech across formal education systems.

Since 2019, the United Nations Children's Fund (UNICEF) Bosnia and Herzegovina has partnered with the Akelius Foundation to enhance students' foreign language acquisition (English and German) with the Akelius app. The Akelius app provides a gamified learning environment with rich, interactive content to help students learn languages in a fun way. Teachers typically leverage the Akelius app to support their teaching through a blended learning approach aided by tablets, which combines digital and non-digital activities in the classroom to enhance the quality of learning and foster digital skills.

In Bosnia and Herzegovina, the Akelius app has been used in formal and non-formal education contexts in Sarajevo canton and Una-Sana canton. This report focuses on formal education in Una-Sana canton. The Akelius app was first introduced in Una-Sana Canton in 2020 to accelerate foreign language acquisition among migrant and refugee children in temporary reception centres. Considering its potential to enhance the quality of learning in the formal education system, the MoE, in collaboration with UNICEF Bosnia and Herzegovina and Save the Children, piloted the use of the Akelius app to enhance foreign language acquisition (English and German) among students in six elementary schools in the canton during the 2022/23 school year.

The MoE is planning to scale up the use of the Akelius app across all elementary schools in the canton in the 2024/25 school year by embedding its use within the methodological guidelines of the English and German curriculum for primary education. This opportunity presents a unique window to systematize blended learning across elementary schools in the canton. Nonetheless, scaling up blended learning initiatives in the formal school system requires careful planning and support in order to create learning ecosystems where teachers can easily utilize EdTech to enhance the quality of their teaching. This research presents evidence from the implementation of the Akelius app in pilot elementary schools of Una-Sana Canton to support decision-making during the scale-up phase. To do this, the brief seeks to address the following three research questions:

1. What were the different approaches that teachers followed to integrate the Akelius app into their teaching practice in pilot schools? What best practices and challenges emerged during the pilot phase?
2. What are the most effective ways to train and support teachers in Una-Sana Canton to deliver and introduce technology in the classroom?
3. What gaps and opportunities exist to scale up blended learning across elementary schools in Una-Sana Canton?

To address these questions, this report leveraged quantitative and qualitative evidence collected during the implementation of the Akelius app in pilot schools. Quantitative and qualitative evidence was collected through different instruments, including school ICT readiness questionnaires, pre/post teacher training questionnaires, classroom observation questionnaires and implementation monitoring forms. This evidence was triangulated with data from a national ICT school infrastructure mapping conducted by UNICEF Bosnia and Herzegovina in 2022. It allows one to compare ICT infrastructure in pilot schools and other elementary schools in Una-Sana Canton.

[Annex 1](#): Implementation research methodology details the content, sample and data-collection process for each instrument.





## 2. The Akelius digital learning application

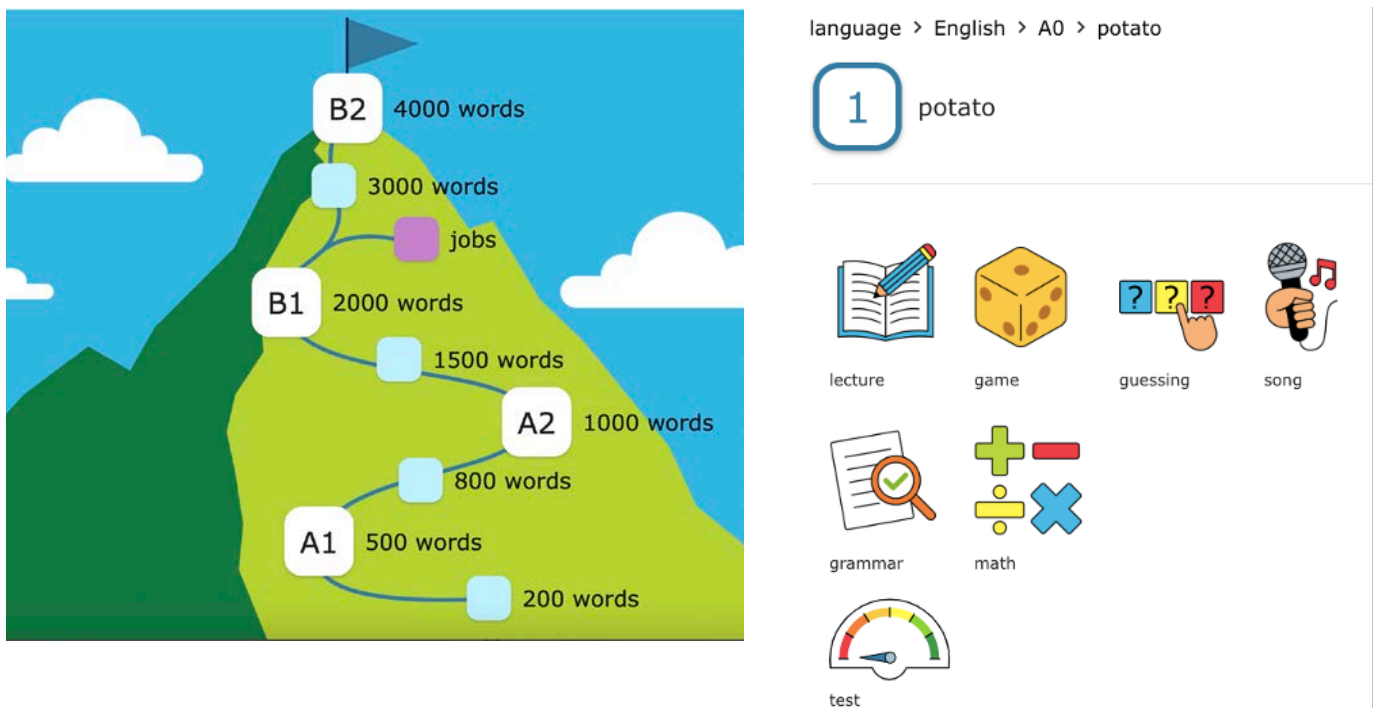
*The Akelius digital learning app is designed to accelerate foreign language acquisition through gamified learning.*

The Akelius digital learning app is designed to accelerate foreign language acquisition through gamified learning. The app offers multimedia interactive content that fosters students' core language competencies, including oral and written comprehension, speaking and writing. The content is structured in chapters that can be easily combined with traditional teaching. Each chapter focuses on a specific communication-grammar goal and employs a mix of interactive video lessons, songs, flashcards, reading and listening passages, quizzes and gamified tests (see Figure 1). Chapters are arranged along structured learning pathways with the basic literacy level starting with approximately 200 words, reaching around 1,000 words at A1 and up to 4,000 words at B2 level. At the end of each lesson, students can evaluate their progress through a gamified test or quiz through which learners receive instant feedback in the app to practise and correct their mistakes until they pass.

The application is free, contains no advertising and requires no prior user information to access. It can be accessed (i) online via a web browser or a mobile application on computers, tablets or mobile phones, (ii) offline when content is pre-downloaded, or (iii) through a classroom server enabling students to access the content from a master tablet even if there is no internet connection. The Akelius app has been used in classrooms in multiple countries with the support of UNICEF country offices, including those in Albania, Bosnia and Herzegovina, Bhutan, Cape Verde, Greece, Italy, Kazakhstan, Lebanon, Mauritania, Mexico, Poland, São Tomé and Príncipe and Serbia. The languages available for learning are English, German, French, Portuguese, Spanish, Italian, Russian, Swedish, Greek and Polish. Research on the implementation and effectiveness of the digital learning application has been conducted in [Bosnia and Herzegovina](#), [Greece](#), [Italy](#), [Lebanon](#) and Mauritania.

**Figure 1.**

- a. The overall learning pathway of the English Akelius app
- b. An individual 10-minute lesson with its different interactive tasks and tests







### 3. Pilot schools and implementation modalities

In the **2022/23** school year, the Akelius app was piloted in six elementary schools in Una-Sana Canton.

In the 2022/23 school year, the Akelius app was piloted in six elementary schools in Una-Sana Canton: OŠ “Gornje Prekounje – Ripač”, OŠ “Harmani I”, OŠ “Harmani II”, OŠ “Ostrožac”, OŠ “Prekounje” and OŠ “Stijena”. All pilot schools in Una-Sana Canton are public elementary schools, attended by girls and boys aged 6–15 following a double-shift system.<sup>3</sup> Pilot schools self-enrolled in the Akelius app pilot and were supported to organize lessons harnessing the Akelius app: English and German schoolteachers attended a two-day teacher training delivered by the University of Bihać to combine the Akelius app with traditional teaching methods in the classroom (blended learning); and schools were supplied with tablets by UNICEF

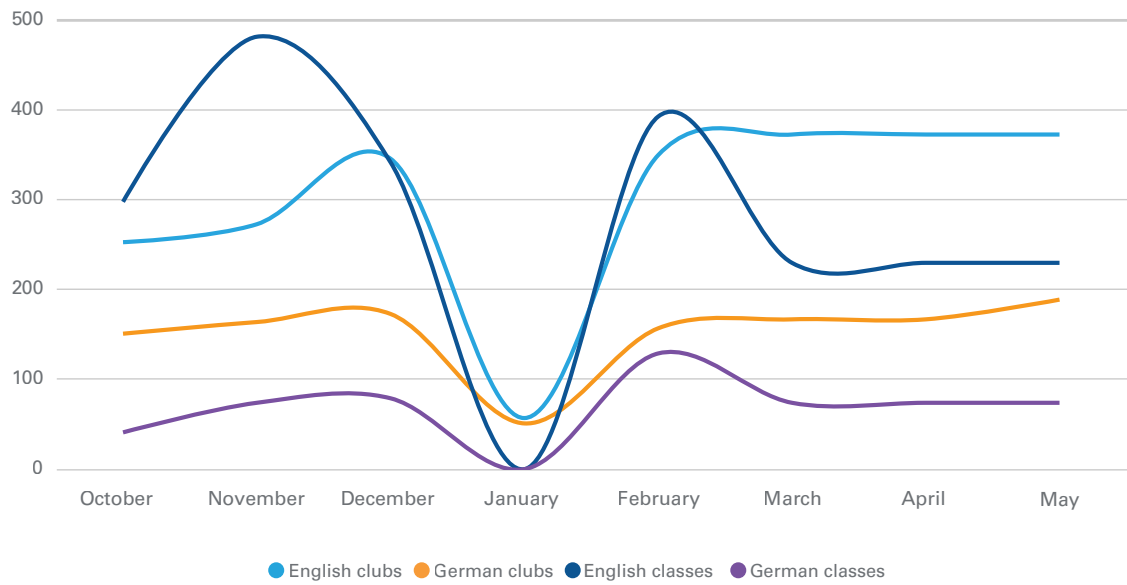
<sup>3</sup> In a double-shift system, schools cater for two entirely separate groups of students during a school day. The first group of students usually attends school from early morning until midday, and the second group usually attends from midday to late afternoon. Each group uses the same buildings, equipment and other facilities (Bray 2008).

Bosnia and Herzegovina to facilitate the implementation of the Akelius app. On average, pilot schools had 20 tablets, or 0.8 tablets per student in each shift and an internet connection of 26 megabytes per second. Implementation in pilot schools was supported by Save the Children educators and education assistants through two main modalities of implementation:

- **Language clubs** are extracurricular English and German classes ran weekly after school hours in pilot schools by Save the Children. Save the Children educators, with the support of an education assistant, leveraged the Akelius app with a blended learning approach aided by tablets, combining digital activities with non-digital activities. Language clubs were organized weekly for grade-level students. Attendance was voluntary for students and clubs were widely attended.
- **Curricular English and German lessons**, in which schoolteachers used the Akelius app, typically with the technical support of Save the Children education assistants. With varying degrees of frequency, schoolteachers introduced the Akelius app as part of their lessons on a voluntary basis. In these classes, education assistants frequently provided schoolteachers with assistance for managing tablets in the classroom or guidance for blended learning, depending on the needs of schoolteachers.

Figure 2 illustrates the monthly student reach for each implementation modality from October to May 2022/2023. On average, 796 students attended language clubs or lessons every month. English language clubs, organized weekly by Save the Children teachers for various school classes, were the most prevalent form of implementation, followed closely by English classes. Notably, the English version of the Akelius app saw greater usage than the German version, both in language clubs and school lessons. While some teachers in English and German classes introduced the Akelius app regularly throughout the school year, others only experimented with it at the beginning of the school year or did not use it at all. The lower reach of the Akelius app during January coincided with school holidays during the month.

**Figure 2. Monthly student reach by implementation modality and language of instruction**







## 4. In-classroom implementation of the Akelius application

Evidence from classroom observations suggests that the organization of classes and implementation of the Akelius application varied between language clubs and curricular language classes and across teachers.

*Each student was given a tablet and a set of headphones to access the content during classes.*

**English and German curricular language lessons were organized for students in all grades, with a greater emphasis on grades 3 to 7** (97 per cent of lessons). These classes were led by a schoolteacher with the support of a Save the Children teacher assistant and typically included 21–30 students (72 per cent of lessons). Each student was given a tablet and a set of headphones to access the content during classes. This set-up allowed students to engage individually with the content in the Akelius app during 100 per cent of lessons. In some classes, all students followed the same content in the app at the same time, while in others, students engaged

with differentiated content tailored to each student's learning needs and pace. In addition to individual learning, teachers incorporated various instructional approaches when utilizing the Akelius app. These approaches included teacher-directed instruction with the assistance of a projector (28 per cent) or pair work (14 per cent).

*Teachers in curricular English and German classes used the Akelius app as a review tool in 73 per cent of lessons observed.*

### **Implementation of the Akelius app in curricular English and German classes varied considerably by teacher and lesson.**

Teachers in curricular English and German classes used the Akelius app to review concepts previously explained in class (73 per cent), as a reward for students (39 per cent) or to complement their lessons with songs and quizzes included in the app (24 per cent). When teachers used the Akelius app as a review tool, they usually focused on reviewing vocabulary (100 per cent of lessons) or practising songs (86 per cent of lessons). This helped prepare students for exams in an engaging way. When teachers used the Akelius app as a review tool, the average usage time was longer during class: Teachers used the Akelius app for 30–45 minutes in 63 per cent of these lessons. Schoolteachers occasionally introduced different activities during the lesson, in connection to the Akelius app such as role playing, singing or enunciating.

In 24 per cent of lessons observed, teachers in curricular lessons used the Akelius app exclusively as a fun reward for students (50 per cent of lessons), without connecting its use with other sections of the lesson or with curricular goals. This approach was more common at the beginning of the school year, when teachers were experimenting with the Akelius app for the first time, or among teachers who were less experienced with the use of technology as part of face-to-face instruction.

**Language clubs were organized weekly for students in grades 2 to 7 after school hours and were led by a Save the Children teacher with the support of a teacher assistant within pilot schools.** Voluntary attendance at language clubs resulted in more heterogeneous classroom sizes compared with curricular school lessons: 59 per cent of lessons had 11–20 students, 19 per cent had 21–30 students and 22 per cent had 10 students or less. Tablets and headphones were also available for all students in language clubs,

allowing students to engage individually with the Akelius app (84 per cent of lessons), in small groups (12 per cent of lessons) or following the teacher with the help of a projector (7 per cent of lessons).

In language clubs, teachers often brought other resources:

30%  
flashcards

30%  
printout materials

5%  
digital resources

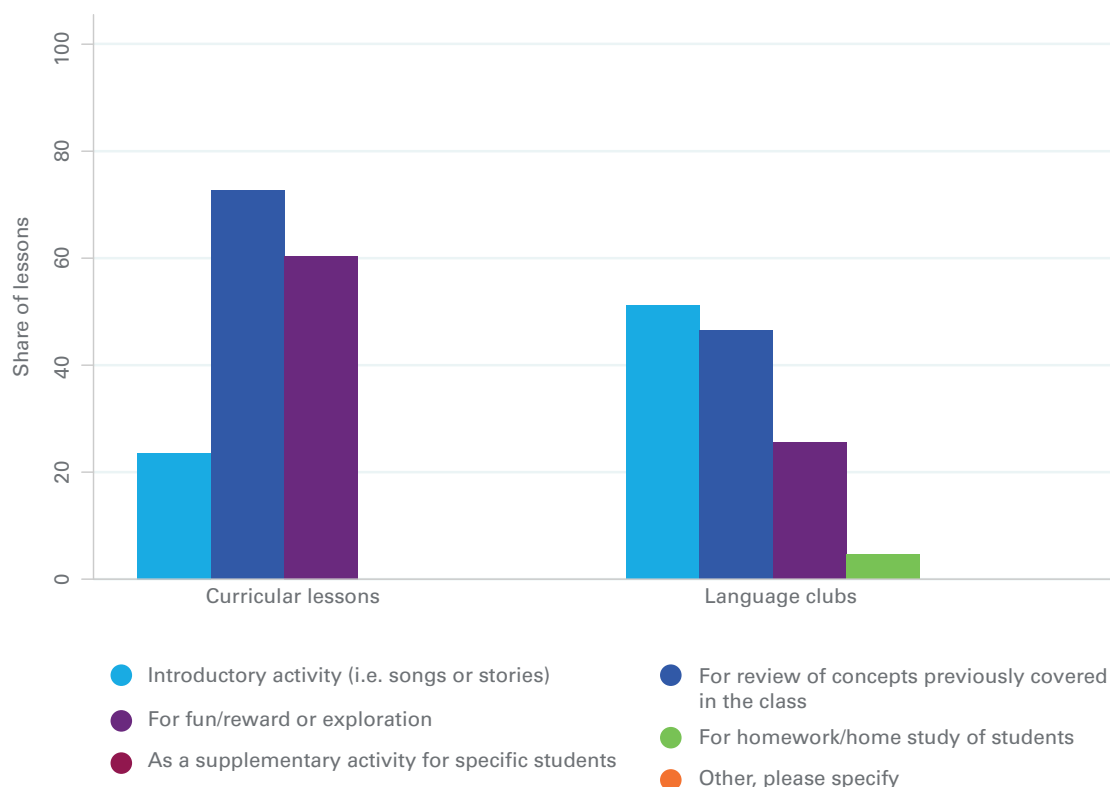
**Language clubs had a specific focus on learning languages through the Akelius app, without the need to follow a set curriculum.**

The Save the Children teachers in charge of language clubs were more experienced with blended learning compared with English and German schoolteachers in pilot schools. This resulted in a greater use of the Akelius app and in more diverse ways compared with curricular school lessons. Figure 3 compares the use of the Akelius app in language clubs and in curricular English and German lessons. Teachers in language clubs used the Akelius app less frequently as a fun reward for students or as a review tool when compared with schoolteachers. Instead, teachers in language clubs made greater use of the songs, quizzes and activities in the Akelius app and connected them with other materials and activities with a structured approach. In language clubs, teachers often brought other resources, such as flashcards (30 per cent of lessons), printout materials (30 per cent of lessons), or other digital resources (5 per cent of lessons). Besides this, other activities were used to complement learning on the Akelius app, such as role playing (80 per cent of lessons), singing (25 per cent of lessons) or enunciating (20 per cent of lessons).

In language clubs, teachers also made greater use of the login functionality of the Akelius app. Students were instructed to log in to the application in 84 per cent of observed language club lessons, compared with 53 per cent in curricular classes. Logging in to the Akelius app promoted continuity in learning across lessons, allowing students to pick up where they left off, and facilitated gamified learning within the app, thereby enhancing student motivation.

Language clubs helped to identify best practices for implementing the Akelius app, which were later used to co-create lesson plans with teachers as part of teacher training programmes.

**Figure 3. Use of the Akelius app in curricular lessons and language clubs**



The experience of the 2022/23 school year testing in six schools provides multiple lessons for the scale up of the programme in 2023/24. Below are key lessons for scale up which cover different aspects of digital learning delivery, starting with the technology and infrastructure available to schools and how they are managed, the preparation of teachers to best utilize the Akelius app in their classes, and what support is needed at a school level to ensure the sustainability of technology use in the classroom.





## 5. Preparing for a successful scale-up of the Akelius application

To prepare for a successful scale-up of the Akelius application across elementary schools in Una-Sana Canton, the following section presents key policy takeaways that emerged from the evidence collected during implementation in pilot schools. These are organized around three main implementation phases:

1. Getting schools ready to harness blended learning
2. Preparing teachers to introduce technology in the classroom
3. Supporting teachers to deliver blended learning



### 5.1. Getting schools ready to harness blended learning

#### **a. Harness available data on ICT infrastructure in Una-Sana Canton elementary schools to identify and support schools lagging behind**

The ICT school infrastructure mapping conducted by UNICEF Bosnia and Herzegovina in 2022 reveals gaps and disparities in



ICT infrastructure among elementary schools in Una-Sana Canton. Differences in access to tablet, computers and internet connection need to be considered for schools to harness the potential of blended learning, including the use of the Akelius app to improve language learning outcomes.

**On average, there are 0.2 devices (tablets and computers) per student in elementary schools in Una-Sana Canton, equivalent to five students for every device.**

This is below the average ratio in Bosnia and Herzegovina (0.3) and below the average ratio in Organisation for Economic Co-operation Development (OECD) countries (0.83) (OECD 2020). Pilot schools were provided with 25 tablets on average to use the Akelius app on. This allowed all students in a classroom to engage with the Akelius app individually or in small groups. Foreign language classes supported by the Akelius app were organized for different groups during the week following a schedule. Non-pilot schools have eight tablets on average, although many elementary schools do not have access to tablets at all (see Figure 5).

*Implementation of the Akelius app is also possible on computers.*

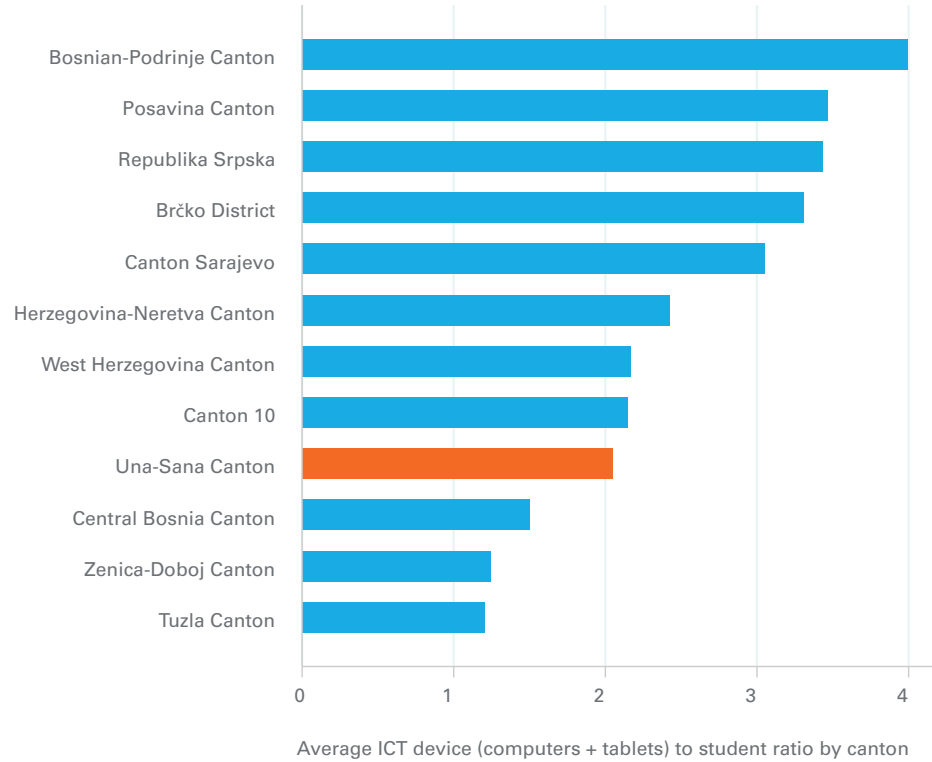
The Akelius app can also be used on computers. The average number of computers at elementary schools in Una-Sana Canton is 26, considerably above the average number of tablets. The 37 elementary schools that completed the school questionnaire also reported having a computer lab, which facilitates the implementation of blended learning. Nonetheless, evidence suggests that computers in Una Sana Canton elementary schools are not always functional, connected to the internet nor accessible to students. Having a functioning computer laboratory available for students or enough tablets for students to engage with the Akelius app, individually or in small groups, is a prerequisite for a successful scale-up of blended learning in Una-Sana canton, including the Akelius app.

**The effective introduction of blended learning across elementary schools in Una-Sana Canton, including the scale-up of the Akelius app, will require enhancing access to devices in elementary schools, particularly among those lagging, and designing adequate implementation strategies.**

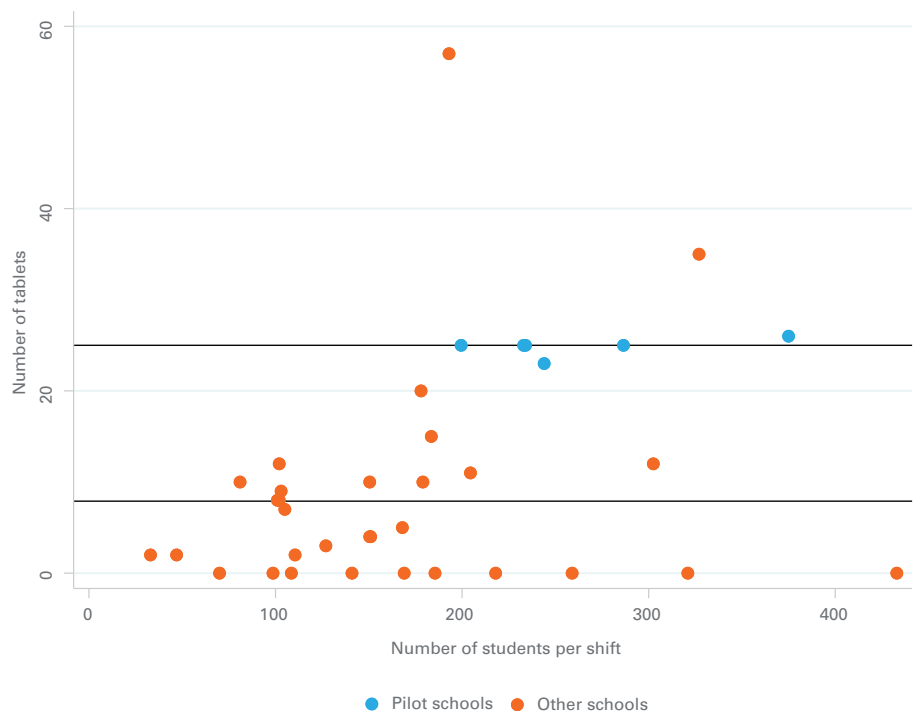
ICT school infrastructure data collected by UNICEF Bosnia and Herzegovina can provide a compass to target resourcing efforts so that inequities across schools in the canton are progressively bridged. Going forward, as Una-Sana Canton develops its EMIS, data on schools' ICT

infrastructure could be a valuable inclusion to guide future decision making.

**Figure 4. Share of ICT devices per student by canton**



**Figure 5. Number of tablets and number of students per shift across elementary schools in Una-Sana Canton**



**b. Support schools with limited internet connection to utilize the Akelius app, including through the use of the Classroom Server feature to enable offline implementation**

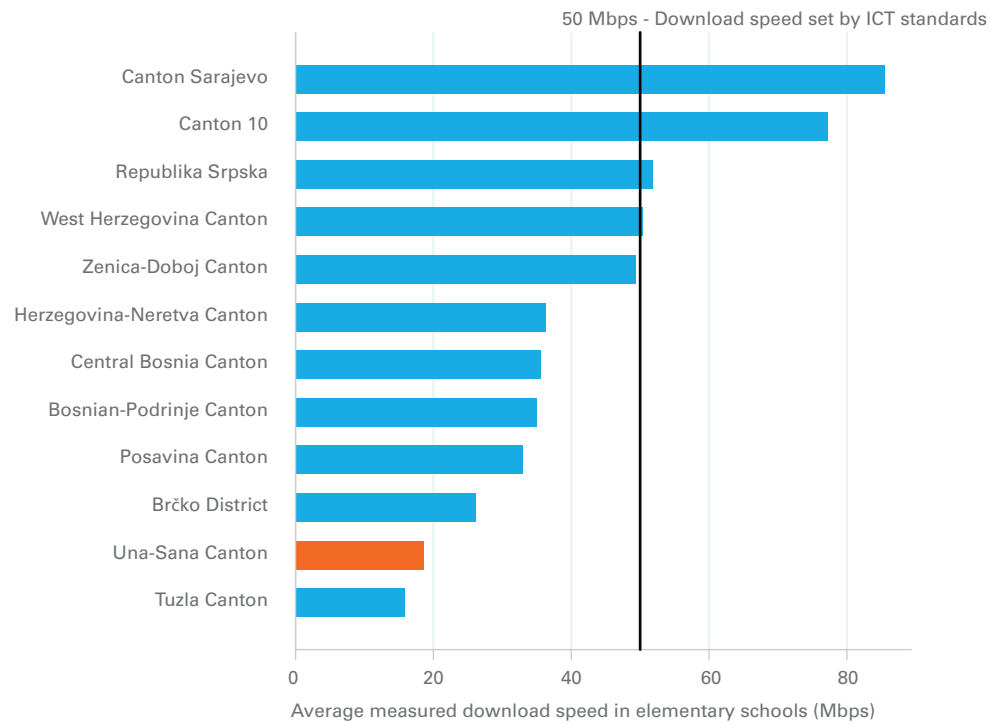
**Schools with limited internet connection need to be provided with specific strategies for using digital learning, including the Akelius app.** The document “Basic Technical Standards for Tools of ICT in Education Systems in Bosnia and Herzegovina”, developed in 2021, provide a technical reference for schools’ ICT infrastructure to deliver quality digital learning. These standards recommend that schools with up to 500 students should have an asymmetric digital subscriber line or fibre-optic internet connection with a minimum download speed of 50 megabits per second (Mbps) and an upload speed of 5 Mbps to ensure students can access digital learning without connectivity issues.

On average, elementary schools in Una-Sana Canton have a download internet speed of

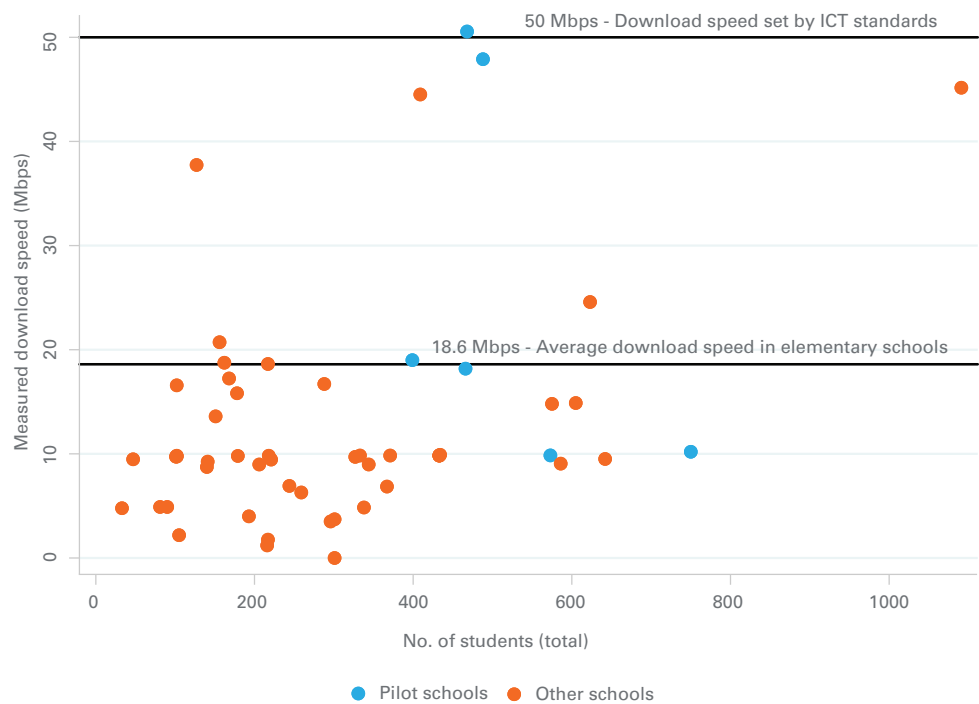
**18.6Mbps.**

On average, elementary schools in Una-Sana Canton have a download internet speed of 18.6 Mbps. This is low compared with the average connectivity in other parts of Bosnia and Herzegovina and below technical standards (see Figure 6). **Limited internet access was the most common challenge to delivering digital learning, reported by 80 per cent of elementary school directors in Una-Sana Canton that completed the school ICT infrastructure questionnaire.** As schools in Bosnia and Herzegovina have been positioned on the global [GIGA map](#), continuous monitoring of internet quality and identification of the most vulnerable clusters of schools and communities are now enabled for the wider public.

**Figure 6. Internet connectivity across elementary schools in Bosnia and Herzegovina**



**Figure 7. Access to internet connectivity across elementary schools in Una-Sana Canton**



Source: UNICEF Bosnia and Herzegovina ICT Infrastructure mapping (2021)

**Pilot schools in Una-Sana Canton had an average internet download speed of 26 Mbps, with sizeable differences across schools (see Figure 7):**

- **Pilot schools with adequate connectivity:** The internet connection in two of six pilot schools (OŠ “Prekounje” and OŠ “Gornje Prekounje – Ripač”) was close to the ICT standards (50 Mbps). In these schools, the Akelius app was more frequently used by schoolteachers, while less technical challenges due to connectivity were reported during lessons where Akelius was used.
- **Pilot schools with limited connectivity:** Two pilot schools had a limited internet download speed, below 12 Mbps. In schools with limited connectivity, challenges related to the internet connection were reported in 83 per cent of school lessons where the Akelius course was used online, compared with 33 per cent of lessons in other schools. These challenges included students’ logging into the application or the momentary interruption of lessons. In 7 per cent of lessons where the Akelius course was to be used, the application could not be opened at all because of problems with connectivity.

*The Classroom Server allows students to access digital learning content on their devices even when there is no internet.*

In pilot schools with limited connectivity, Save the Children educators piloted the use of the Classroom Server to facilitate access to Akelius app content. The Classroom Server feature enables students to access content stored on the teacher's tablet without requiring an internet connection. Through a basic Wi-Fi router, students can connect to a lightweight server operating offline on a teacher's device. This way, the Akelius app Classroom Server allows students to access content offline by connecting to the teacher's tablet where the material has been previously downloaded. Additionally, teachers can monitor students' learning progress, activities and quiz scores within the app through the teacher mode interface of the Classroom Server. This elaborated offline feature can effectively support low connectivity schools to utilize the Akelius app.



Besides equipping schools with ICT infrastructure and strategies to deliver blended learning, preparing teachers to include technology in the classroom is an important step forwards: from the use of technology as an emergency measure linked to the COVID-19 pandemic to the use of technology in classrooms to enhance the quality of learning.



## 5.2. Preparing teachers to introduce technology in the classroom

A two-day teacher training programme on blended learning and the Akelius app was provided to English and German elementary schoolteachers during the

**2022/23**

school year as part of scale-up plans from the MoE in Una-Sana Canton.

### c. Connect theory with practice through hands-on teacher training

A two-day teacher training programme on blended learning and the Akelius app was provided to English and German elementary schoolteachers during the 2022/2023 school year as part of scale-up plans from the MoE in Una-Sana Canton. Teacher training was delivered by the University of Bihać and officially recognized by the MoE so that teachers could receive training credentials on completion for career advancement. Training sessions were aligned with the “Guidelines for improving online and blended teaching and learning in educational systems in Bosnia and Herzegovina in the context of quality (and) inclusive education”, developed by UNICEF Bosnia and Herzegovina in 2022 to outline key pedagogical and digital competences needed for blended learning. Training delivery was organized using a phased approach to reach all 94 English and German schoolteachers in the canton in two training sessions in January and June.

#### **Teacher training encouraged the uptake of the Akelius app.**

Following the first teacher training session in January, 64 per cent of attending teachers reported using the Akelius app as part of their teaching in the following months, before the Akelius app was included as part of the methodological guidelines of the new curriculum in the canton. Pre/post teacher training survey results also show that teacher training was associated with gains in the teachers’ capacity to incorporate technology as part of their teaching to support students’ individual learning needs or to set clear learning goals for a lesson and incorporate technology to pursue them.

*Providing teachers with a combination of practical teacher training, scripted lesson plans and mentoring support is one of the most cost-effective interventions to support teachers in updating their pedagogical approaches.*

What aspects of training encouraged positive effects? **Evidence collected as part of teacher training suggests that practical training sessions, with hands-on exercises demonstrating pedagogical approaches to introduce technology in the classroom, were most appreciated by teachers.** A majority of teachers (84 per cent) stressed that the most useful part of the training were its practical aspects, including practical exercises with Akelius course (48 per cent) or different examples for incorporating the Akelius course in class (36 per cent). Overall, teachers were very satisfied with the quality of training. On average teachers rated the training with a score of 8 out of 10. When asked what additional content could be included in the training, teachers requested more practical exercises for using the Akelius course (44 per cent). This mirrors evidence from other countries where the Akelius app is implemented, suggesting that teacher trainings that provide opportunities for hands-on learning are effective for preparing teachers for delivering blended learning (Haßler et al. 2020; Valenza and Dreesen 2023).

#### **d. Encourage and support teachers to integrate the Akelius app into their lesson planning**

**Blended learning entails a considerable shift in teachers' pedagogical approaches in the classroom.** Introducing technology in the classroom, including Akelius app, means that teachers need to rethink how they plan and deliver their lessons. This can be a time-consuming process, for which teachers need support. Following teacher training, 40 per cent of teachers reported that additional guidance and materials for using the Akelius app in alignment with curriculum goals would be useful.

To prepare for the scale-up of the Akelius app across elementary schools in Una-Sana Canton, the MoE developed guidelines for integrating the application in the curricula for third, fourth and fifth grades for German and English. Building on these guidelines, **structured lesson plans could be developed to facilitate teachers' lesson planning using the Akelius app:**

- Structured lesson plans can suggest different implementation strategies that teachers can adopt in order to utilize the Akelius app in their language classes to achieve specific curricular objectives. This includes utilizing the Akelius app as a review tool, a remedial tool for students falling behind or a tool for gamified learning.
- Structured lesson plans can detail other digital activities such as educational videos, and non-digital activities such as oral or written production activities, which can be combined in a lesson to achieve specific learning outcomes in the curriculum.

Beyond structured lesson plans, additional guidance for using the Akelius course in alignment with curriculum goals can also include the use of **peer learning** to observe how other teachers use the Akelius course in the classroom, or **mentoring** from Akelius course experts, such as the Save the Children educators that participated in pilot schools. This aligns with evidence from the Global Education Evidence Advisory Panel, which suggests that providing teachers with a combination of practical teacher training, scripted lesson plans and mentoring support is one of the most cost-effective interventions to support teachers in updating their pedagogical approaches (Banerjee et al. 2023).

Besides preparing teachers to integrate technology in the classroom, evidence suggests that providing school-level support and incentives for teachers to do so is crucial to promote its adoption. The following section explores school-level strategies for supporting teachers in delivering blended learning.



### 5.3. Supporting teachers to deliver blended learning

#### **e. Provide teachers with support and incentives at the school level to leverage digital learning, including through ICT coordinators**

*All school directors in elementary schools who completed the school questionnaire agreed or strongly agreed that the introduction of technology in the classroom can help to enhance students' motivation and learning.*

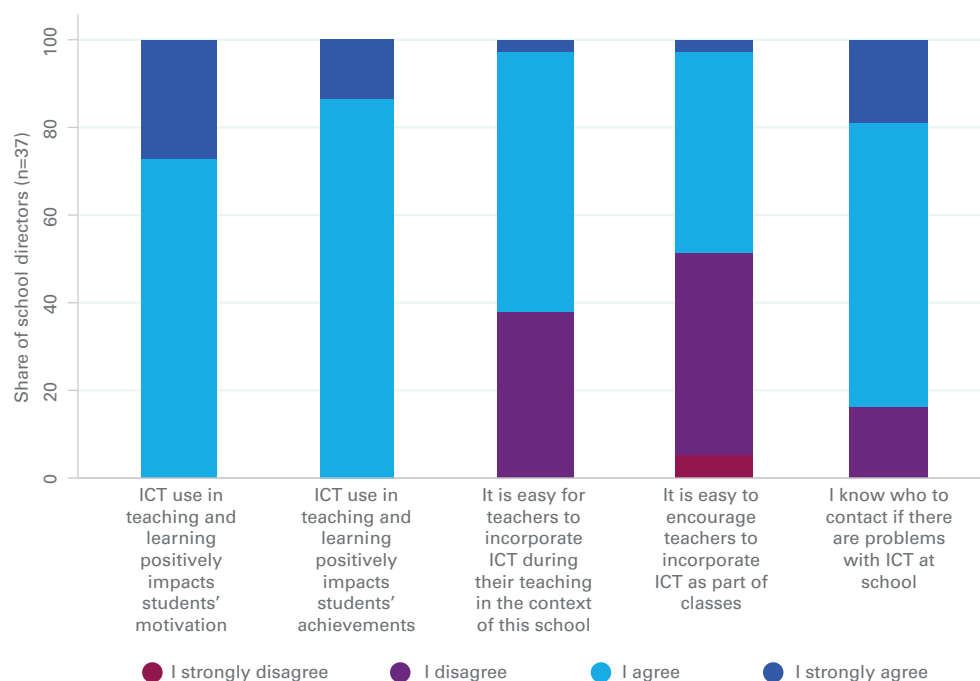
### **Implementation evidence in curricular English and German lessons suggests that the take-up of the Akelius app was unequal among teachers in pilot schools.**

While 5 out of 22 English and German schoolteachers in pilot schools (23 per cent) incorporated the Akelius app regularly as part of their lessons (up to 25 times in the school year), 8 out of 22 teachers (36 per cent) used the Akelius app only 1–5 times, and 9 out of 22 (41 per cent) did not use it at all. Frequency of implementation among schoolteachers also declined during the school year. Academic evidence suggests that teacher-level factors, such as intrinsic motivation to introduce technology in the classroom and prior experience with blended learning, or school-level factors, such as schools' ICT infrastructure, can be driving factors to experiment with new pedagogical approaches that incorporate technology, including the Akelius app (Brossard et al. 2021; Nicolai et al. 2022).

### **Beyond pilot schools, school directors and teachers also considered that it can be difficult to motivate teachers to introduce technology in the classroom.**

All school directors in elementary schools who completed the school questionnaire agreed or strongly agreed that the introduction of technology in the classroom can help to enhance students' motivation and learning. Yet, 45 per cent of school directors disagreed that it was easy to motivate teachers to incorporate technology in the classroom in the context of their school (see Figure 8). In follow-up questionnaires with teachers that attended teacher training, 59 per cent of teachers report the need for additional incentives to incorporate technology in the classroom. Differences in teachers' motivation need to be considered when planning for the scale-up of blended learning at the systems level, to develop effective support strategies for teachers and schools with different characteristics.

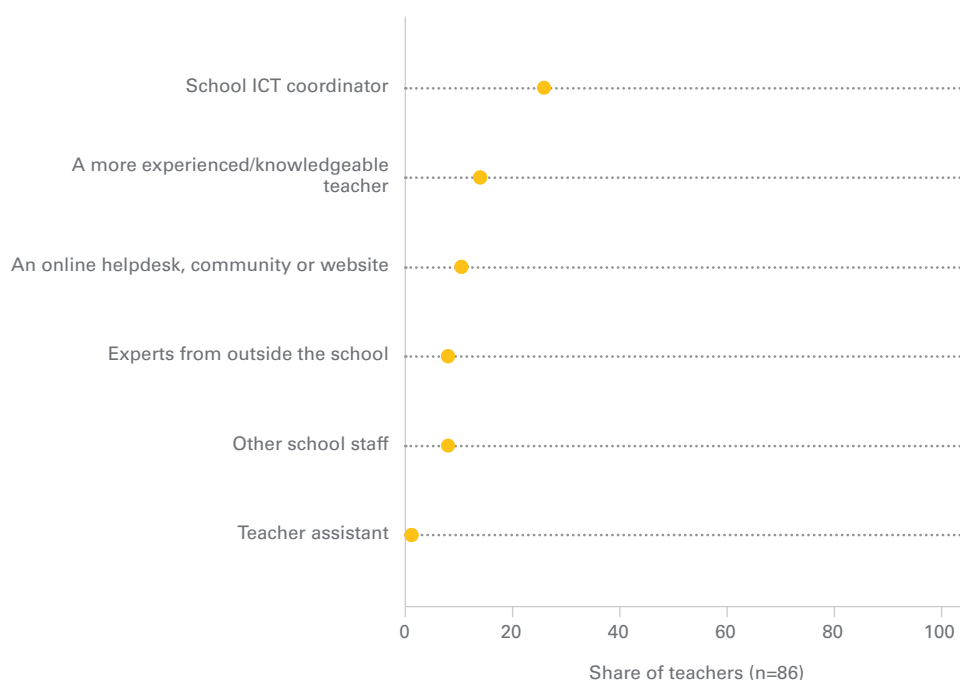
**Figure 8. School leaders' attitudes and perceptions for implementing blended learning in their schools**



**When schoolteachers incorporate technology in the classroom they assume additional responsibilities on top of their regular teaching for which they do not always have support or incentives.** 40 per cent of teachers that attended teacher training reported not being able to access any type of support when using technology in the classroom. When teachers can access support, this usually included support from schools' ICT coordinators (26 per cent) or a more experienced or knowledgeable teacher (14 per cent) (see Figure 9). Among the school directors that completed the school questionnaire, 25 per cent did not know who to contact if there were problems with ICT at school.



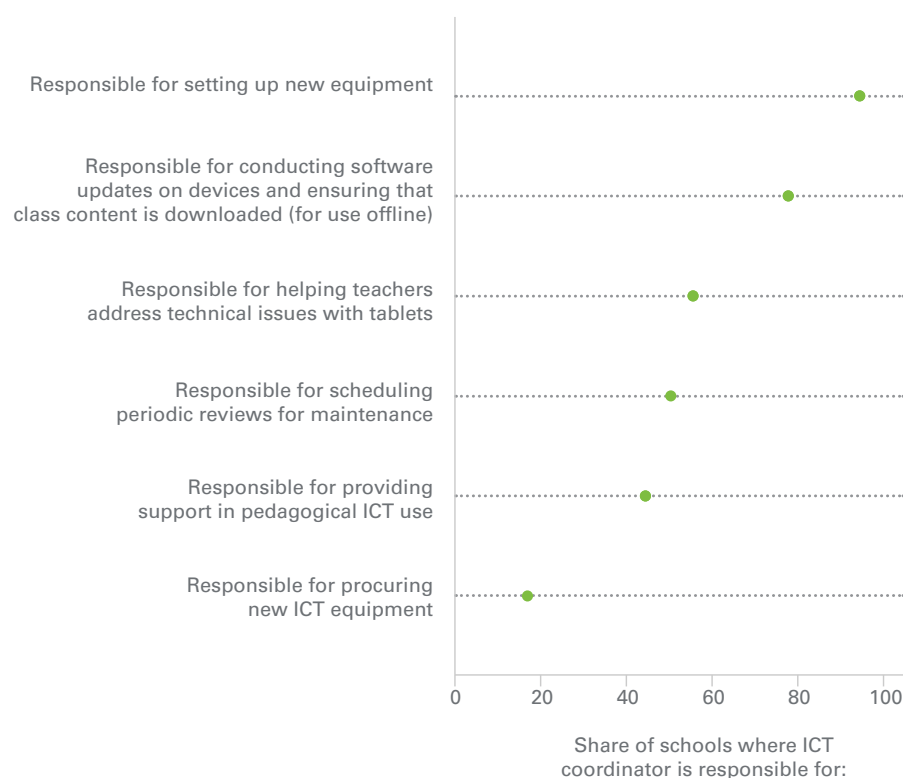
**Figure 9. Access to support when using ICT in the classroom**



**Appointing, training and supporting school ICT coordinators in Una-Canton elementary schools can support teachers to incorporate technology in the classroom, including the Akelius app.**

49 per cent of elementary school directors reported their school has an ICT coordinator, with no statistically significant differences among pilot and other schools. ICT coordinators in Una-Sana Canton elementary schools are usually teachers or other school staff with a good understanding of ICT, who provide support when available, but not dedicated staff with special training or retribution. ICT coordinators are only available full-time in 27 per cent of elementary schools and are specifically rewarded for such a function in 11 per cent of them. This can limit their availability to support teachers in implementing blended learning. When available, ICT coordinators are responsible for setting up new equipment (94 per cent), conducting software updates on devices and ensuring that class content is downloaded (for use offline) (77 per cent), providing teachers with support to address technical issues (55 cent) and pedagogical guidance for embedding ICT in the classroom (44 per cent) and with support to address technical issues (44 cent) (see Figure 10).

**Figure 10. School ICT coordinators: Roles and responsibilities**



Number of schools that have an ICT coordinator (n=18)

### **f. Support the development of school ICT protocols, tablet laboratories and adequate storage facilities to facilitate the introduction of technology in the classroom**

**The introduction of technology in the classroom often requires time before and after each lesson to prepare, distribute, collect and store ICT devices.** On average, schoolteachers in pilot schools took 12 minutes to prepare tablets for use in class and additional time to collect and store them after the lesson. These logistical hurdles are not always accounted for when planning for the introduction of EdTech, leading to time-consuming processes that can detract from learning or discourage teachers from implementing technology in the classroom.

**Proper planning is necessary for the effective use, storage and maintenance of EdTech.** This enables teachers to incorporate technology without experiencing delays, flaws or security issues. In some pilot schools, school-level ICT protocols, dedicated rooms for working with tablets, or adequate storage facilities facilitated this process:

- **School ICT protocols** set guidelines for the appropriate use of digital technologies in schools, including when and where they can be utilized, as well as instructions for storage and maintenance. School ICT protocols can also offer guidance for successfully integrating digital technologies into the classroom and provide contact information for technical support. ICT protocols are not commonly implemented in Una-Sana Canton elementary schools: besides one pilot school, no other school had a school-level ICT protocol. The UNICEF-Akelius project has produced a set of practical guidelines for the introduction of EdTech in the classroom which provide practical information for the development of EdTech or digital learning procedures in Una-Sana Canton schools. These guidelines cover different topics including specifications for ICT equipment, tablet set-up and management or classroom management.

*Tablet laboratories are dedicated classrooms for learning with tablets, where tablets are always stored and used.*

- **Tablet laboratories** are dedicated classrooms for learning with tablets, where tablets are always stored and used. Two pilot schools, OŠ “Ostrožac” and OŠ “Prekounje”, had a dedicated room for working with tablets where tablets were always kept. Having a tablet laboratory facilitated logistics for incorporating EdTech into the classroom and encouraged its use. Compared with schoolteachers in other pilot schools, schoolteachers in these schools spent less time before and during each lesson carrying and distributing tablets for students to use. Given that internet connectivity was also particularly reliable in tablet laboratories, less internet challenges were also experienced in this classroom. Among elementary schools with tablets in Una-Sana Canton, 19 per cent had a tablet laboratory, commonly used as language or phonetic labs. All elementary schools in the sample also had a computer laboratory, although equipment was often outdated.
- **Adequate storage systems**, such as charging racks for tablets and protective cases, help keep tablets in good form and ready for usage. In one pilot school, charging racks with locks helped keep tablets safe while facilitating the charging process; more than 90 per cent of tablets could be charged at the same time using this

approach. In schools where charging racks were not available, teachers or Save the Children education assistants needed to make sure that all tablets were adequately charged before the start of the class, which created an additional burden. Outside of public schools, 76 per cent of elementary schools with tablets keep these in a dedicated safe space. Among these, elementary schools usually make use of a locker or room with a lock (88 per cent) or a charging rack with lock (12 per cent).

As the Akelius app is introduced across elementary schools in Una-Sana Canton, supporting or encouraging schools to develop adequate processes for managing and maintaining tablets can enable teachers to introduce technology more seamlessly in the classroom.







## 6. Conclusion

*A successful scale-up will require preparing and supporting schools and teachers for an effective implementation of the Akelius app.*

With the right implementation, evidence suggests that teachers can leverage EdTech to enhance students' motivation while addressing students' individual learning needs (Kovačević et al. 2018; Poleschuk et al. 2023). This holds promise in Una-Sana Canton, where outdated teaching methods, materials and resources can hamper quality learning (Kovačević et al. 2018; Džanić and Hasanspahić 2020).

The scale-up of the Akelius app across elementary schools in Una-Sana Canton presents a unique window in which to systematize the use of technology in classrooms across elementary schools in the canton. But a successful scale-up will require preparing and supporting schools and teachers for an effective implementation of the Akelius app.

This report presented evidence from the pilot implementation of the Akelius app in six schools of Una Sana Canton, including evidence from in-classroom implementation by teachers. The lessons learned presented below provide strategies for supporting schools, teachers



and learners for an effective scale-up of the Akelius app. These are organized around key steps in the scale-up process:

**1. Getting schools ready to harness blended learning:**

Differences in access to digital devices and connectivity across elementary schools can hinder an equitable scale-up of blended learning in Una-Sana Canton, including the Akelius app. Available EMIS and ICT infrastructure data can be used to identify and support schools lagging in access to connectivity and devices. In schools with limited connectivity or low device-to-student ratios, implementation of the Akelius app can be supported through a careful scheduling of Akelius app lessons and the use of the Classroom Server, which allows students to access digital learning content on their devices offline.

**2. Preparing teachers to incorporate technology in the classroom:**

Blended learning, or the combination of digital and non-digital activities in the classroom, presents a considerable departure from how teachers in Una-Sana Canton usually prepare and deliver their lessons. Practical teacher training programmes, which offer opportunities for hands-on learning, are fundamental to building skills among teachers who have limited experience with blended learning. This includes practising how to troubleshoot devices or how to manage the classroom when using the Akelius app. Equipping teachers with structured lesson plans, which present digital and non-digital activities that can be combined in a lesson to achieve specific curricular goals, can also support teachers to incorporate the Akelius app in their lesson plans.

**3. Supporting teachers to deliver blended learning:**

Introducing technology in the classroom requires time from teachers to get familiar with the Akelius app, prepare lessons, distribute, collect and store ICT devices before and after each class. In Una-Sana Canton elementary schools, well-equipped ICT coordinators could support this process. School ICT protocols, tablet laboratories, adequate charging and storage systems and incentives to incorporate technology can also facilitate and encourage the introduction of technology in the classroom.

*Practical teacher training programmes, which offer opportunities for hands-on learning, are fundamental to building skills among teachers who have limited experience with blended learning.*

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# Annex 1: Implementation research methodology

Research was built in the implementation of the Akelius app through different instruments:

- 1. School ICT readiness questionnaires** were used to capture schools' preparedness to introduce technology in their classrooms. The questionnaire considers schools' ICT infrastructure, staff roles and school leaders' attitudes towards digital learning. In January 2023, the MoE shared the questionnaire with all 73 elementary schools in Una Sana Canton, 37 of which gave responses. School directors were responsible for completing the questionnaire online. This data was triangulated with a nationwide ICT school-mapping conducted by UNICEF in 2022 to consider additional data on schools' connectivity and infrastructure.
- 2. Pre/post teacher training forms** were used to capture teachers' prior experience using technology in the classroom and changes in teachers' attitudes and knowledge around blended learning pedagogies well as the Akelius app following teacher training. Teacher training forms were completed by English and German schoolteachers before and after attending a two-day teacher training programme on blended learning, with a focus on the Akelius app, provided by the University of Bihać (Una-Sana Canton). Forms were completed by 92 teachers that attended teacher training in January and June 2023, including teachers from 14 pilot schools and 92 other elementary schools in Una-Sana Canton.
- 3. Implementation reporting forms** were used to capture the weekly student reach of the Akelius app across pilot schools, together with any challenges or best practices during implementation. Forms were completed weekly between October 2022 and May 2023 by Save the Children teacher assistants.
- 4. Classroom observation forms** were used to understand teachers' pedagogical approaches and classroom context, levers and challenges when using the Akelius digital learning platforms. Classroom observation forms were completed by Save the Children teacher assistants after providing support to teachers during English and German curricular classes or during language clubs. Classroom observation forms were completed weekly for every curricular classroom supported between October 2022 and May 2023. Between January and May 2023, three weekly forms were also completed by each teacher assistant after providing support to language clubs. In total, 184 forms were completed.

**5. Teacher feedback forms** were used to understand teachers' implementation of the Akelius app following teacher training. Forms were completed by 22 teachers – out of the 42 that attended teacher training in January 2023.

Evidence for this report also builds on qualitative evidence collected in 2022 within temporary reception centres and pilot schools to assess implementation efforts and the effects of the Akelius app to support the education and inclusion of refugees and migrant children in Bosnia and Herzegovina (Poleschuk et al. 2023). Evidence collected from all data-collection instruments was analysed using statistical methods and triangulated with existing evidence on the implementation of the Akelius app in other countries (i.e., Italy, Lebanon and Greece) and academic evidence on blended learning for foreign language acquisition.

Research instruments and fieldwork protocols used for research on the Akelius digital learning programme in other countries were revised and adapted for the Bosnia and Herzegovina context and approved by the Health Media Lab and the Institutional Review Board of the Office for Human Research Protections in the United States of America. The fieldwork, data collection and research activities were conducted in line with ethical principles and practices, which include respecting the dignity of participants, abiding by just and equitable treatment, preventing the potential risk of harm, giving informed and ongoing consent and confidentiality. Research findings are presented in the following section.



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